above 3 kilowatts.

71. (New) The method according to Claim 42, wherein the ICP coil generator includes integrated components.

72. (New) The method according to Claim 42, wherein the ICP coil generator causes a variation of the frequency of the radio-frequency electromagnetic alternating field so that the impedance is matched as a function of the pulsed plasma power to be injected.

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73. (New) The method according to Claim 42, wherein the ICP coil generator causes a variation of the frequency of the radio-frequency electromagnetic alternating field so that the impedance is matched as a function of the pulsed plasma power to be injected, so as to provide rapid switching between the plasma power pulses and interpulse periods.

REMARKS

Claims 61 to 73 have been added, and therefore claims 42 to 73 are now being considered (since claims 30 to 41 have been restricted).

Applicants respectfully requests reconsideration of the present application in view of this response.

With respect to page three (3) of the Office Action, claims 45 and 47 to 59 were rejected as indefinite under the second paragraph of 35 U.S.C. § 112. Applicants have rewritten claims 45, 47 and 50 to 53 to better define the claims. Claim 54 has been rewritten to provide proper antecedent basis for the claim features. Claims 48 and 49 depend from claim 47, which is definite as presented. Claims 55 to 59 depend from claim 54, which is definite as presented. It is therefore respectfully requested that the indefiniteness rejections of claims 45 and 47 to 59 be withdrawn.

With respect to page four (4), claims 42, 43, 47 and 50 were rejected under 35 U.S.C. § 102(b) as anticipated by Kadomura, U.S. Patent No. 5,662,819.

Claim 42 as presented relates to a method for etching a silicon body substrate using a device having an ICP source for generating a radio-frequency electromagnetic alternating field, a reactor for generating an inductively coupled plasma from reactive particles by the action of the radio-frequency electromagnetic alternating field on a reactive gas, and a first means for generating plasma power pulses to be injected into the inductively coupled plasma

by the ICP source. Claim 42 includes the features of matching an impedance of one of an inductive coupled plasma and the ICP source to an ICP coil generator, and injecting a pulsed radio-frequency power into the inductively coupled plasma as a pulsed plasma power. Support for claim 42 as presented may be found, for example, on page 5, lines 24 to 28 of the specification (and in the German priority application at lines 11 to 21 of page 6).

The Kadomura reference purportedly relates to a plasma processing apparatus and method for carrying out plasma processing by using such a plasma processing apparatus, but it does not identically describe (or even suggest) the feature of matching an impedance of one of an inductive coupled plasma and the ICP source to an ICP coil generator. The Kadomura reference only refers to an "impedance-matching first matching network M/N 64" (col. 10, lines 1 to 10), and is wholly silent regarding matching impedances of the inductively coupled plasma and the ICP source to an ICP coil generator, as well as regarding the presence of ICP coil generators. Since Kadomura does not identically describe (or even suggest) the features of claim 42 as presented, claim 42 is allowable, as are its dependent claims 43, 44, 45, 47, 48, 49 and 50.

With respect to page five (5), claims 42, 43, 50, 54 and 57 were rejected under 35 U.S.C. §102(b) as anticipated by Savas, WO 97/14177.

The Savas reference purportedly relates to an apparatus and method for pulsed plasma processing of a semiconductor substrate, but it does not identically describe (or even suggest) matching an impedance of one of an inductive coupled plasma and the ICP source to an ICP coil generator. In fact, it does not refer to any importance of impedance matching. The Savas reference is also deficient as to any disclosure of ICP coil generators. Since Savas does not describe (or even suggest) the features of claim 42 as presented, claim 42 is allowable, as are its dependent claims 43 to 45, 50 to 54, and 56 to 59.

With respect to page six (6), claims 42, 43, 50, 54 and 56 to 58 were rejected under 35 U.S.C. § 102(e) as anticipated by Koshimizu, U.S. Patent No. 5,935,373.

The Koshimizu reference purportedly relates to a plasma processing apparatus, but it does not identically describe (or even suggest) matching an impedance of one of an inductive coupled plasma and the ICP source to an ICP coil generator, since Koshimizu merely refers to a "matching circuit" 114. (Col. 4 lines 4 to 8). Also, Koshimuzu is silent as to what function the "matching circuit" performs, and is further deficient since it does not identically describe (or even suggest) an ICP coil which has an impedance that is matched to an inductive coupled plasma and an ICP source. Since Koshimizu does not identically describe (or even suggest)

the features of claim 42 as presented, claim 42 is allowable, as are its dependent claims 43, 44, 45, 50, 51 to 54 and 56 to 59.

Claims 44, 45, 48 and 49 were rejected under 35 U.S.C. § 103(a) as unpatentable over the Kadomura reference.

Claims 44, 45, 48 and 49 are not obvious and are therefore allowable for essentially the reasons explained above as to claim 42, from which these claims depend. As explained above, the Kadomura reference does not describe nor suggest the feature of matching impedances of the inductively coupled plasma and the ICP source to an ICP coil generator.

With respect to page nine (9), claim 46 was rejected over Kadomura in view of Koshimizu '687 U.S. Patent 5,997,687.

The Koshimizu'687 reference does not cure the critical defects of the Kadomura reference. The Koshimizu '687 reference provides two matching circuits 125 and 132, and involves matching frequency resonance conditions in the reactor (col. 3 , lines 5 to 8), but it limits the matching circuit 125 to matching these resonance conditions. (Col. 5, lines 52 to 54). The matching circuit 132 may have a corresponding function of matching resonance conditions (col. 6, lines 5 to 8), but the reference does not disclose, or even suggest, any relation to impedances. Furthermore, Koshimuzu '687 does not disclose, or even suggest, matching an impedance of one of an inductive coupled plasma and the ICP source to an ICP coil generator. As a result, even if Kadomura and Koshimizu '687 are combined (the properness of which is not conceded), the result would not provide the features of claim 46 as presented, so that claim 46 is allowable.

With respect to page ten (10), claim 60 was rejected under 35 U.S.C. § 103 as obvious over Kadomura in view of Laermer et al., U.S. Patent No. 5,501,893.

As explained above, Kadomura does not disclose, or even suggest, matching an impedance of one of an inductive coupled plasma and the ICP source to an ICP coil generator. The secondary Laermer reference does not cure the critical defects of Kadomura, since it does not disclose (or even suggest) matching an impedance of one of an inductive coupled plasma and the ICP source to an ICP coil generator. The Laermer reference merely refers to providing etching and polymerization until a predetermined etching depth is reached (col. 4, lines 63 to 65), but is silent regarding matching impedances. Since the combination of Kadomura and Laermer does not disclose (or even suggest) all the features of claim 42 as presented, claim 60 is allowable since it depends from claim 42.

With respect to page eleven (11), claim 46 was rejected under 35 U.S.C. § 103 as

unpatentable over Savas in view of the Koshimizu '687 reference.

As explained above, Savas and Koshimizu '687 do not disclose or even suggest matching an impedance of one of an inductive coupled plasma and the ICP source to an ICP coil generator. For this reason, the combination of Savas and Koshimizu '687 do not disclose, or even suggest, the features of claim 42, so that claim 46 is allowable since it depends from claim 42.

With respect to page twelve (12), claim 60 was rejected as unpatentable under 35 U.S.C. § 103 over Savas in view of Laermer.

Claim 60 depends from claim 42 and is therefore allowable for the same reason as claim 42 as explained above, since Savas and Laermer do not disclose or even suggest matching an impedance of one of an inductive coupled plasma and the ICP source to an ICP coil generator. For this reason, it is respectfully submitted that the combination of Savas and Laermer do not disclose, or even suggest, the features of claim 42, so that claim 60 is allowable.

With respect to page twelve (12), claims 47 to 49 and 55 were rejected as unpatentable under 35 U.S.C. § 103(a) over Savas in view of Lymberopoulos et al., U.S. Patent No. 6,085,688.

Claims 47 to 49 and 55 depend from claim 42 as presented, and therefore include all of its features. As explained above, Savas does not disclose or even suggest matching an impedance of one of an inductive coupled plasma and the ICP source to an ICP coil generator, and Lymberopoulos does not cure the critical defects of Savas. In fact, Lymberopoulos teaches away from impedance matching by stating that dynamic impedance matching is not effective (col. 5, lines 27 to 28), and it therefore does not disclose, or even suggest, matching an impedance of one of an inductively coupled plasma and the ICP source to an ICP coil generator, so that claims 47 to 49 and 55 are allowable.

With respect to page fifteen (15), claim 46 was rejected under 35 U.S.C. § 103(a) as unpatentable over Koshimizu in view of the Koshimizu '687 reference. Claim 46 is allowable for the same reasons as claim 42 from which it depends, since the combination of Koshimizu and Koshimizu '687 does not disclose or even suggest matching an impedance of one of an inductive coupled plasma and the ICP source to a ICP coil generator, as in claim 42.

With respect to page fifteen (15), claim 60 was rejected 35 U.S.C. § 103(a) as unpatentable over Koshimizu in view of the Laermer reference.

Claim 60 depends from claim 42 and is therefore allowable for the same reasons as

claim 42 as presented, since Koshimizu and Laermer do not disclose, or even suggest, matching an impedance of one of an inductively coupled plasma and the ICP source to an ICP coil generator.

With respect to page sixteen (16), claims 47 to 49, 54 and 55 were rejected 35 U.S.C. § 103(a) as unpatentable over Koshimizu in view of the Lymberopoulos reference.

Claims 47 to 49, 54 and 55 depend from claim 42 and are therefore allowable for the same reasons as claim 42 as presented, since Koshimizu and Lymberopoulos do not disclose or even suggest matching an impedance of one of an inductively coupled plasma and the ICP source to an ICP coil generator.

New claims 61 to 73 do not add any new matter and are supported in the specification. Each of claims 61 to 73 depend from claim 42, and are therefore allowable at least for the same reasons as claim 42.

CONCLUSION

In view of the above, it is believed that the objections and the rejections have been obviated, and it is respectfully submitted that claims 42 to 73 are allowable. It is therefore respectfully requested that the objections and rejections be reconsidered and withdrawn, and that the present application issue as early as possible.

Respectfully submitted,

Dated: 5/28/2003

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AMENDMENT VERSION WITH MARKINGS

IN THE CLAIMS:

Without prejudice, please add claims 61 to 73 as indicated above, and please amend the claims as follows:

42. (Amended) A method for etching a silicon body substrate [(10)] using [the device according to Claim 31] a device having an ICP source for generating a radio-frequency electromagnetic alternating field, a reactor for generating an inductively coupled plasma from reactive particles by the action of the radio-frequency electromagnetic alternating field on a reactive gas, and a first means for generating plasma power pulses to be injected into the inductively coupled plasma by the ICP source, comprising [the step of]:

matching an impedance of one of an inductive coupled plasma and the ICP source to an ICP coil generator; and

injecting a pulsed radio-frequency power into the inductively coupled plasma [(14)] as a pulsed plasma power.

45. (Amended) The method according to Claim 42, wherein a plasma power of 300 watts to 5000 watts on [the] a time average is injected into the inductively coupled plasma [(14)] and that the generated individual pulse powers of the radio-frequency power pulses are between 300 watts and 20 kilowatts[, in particular 2 kilowatts to 10 kilowatts].

47. (Amended) The method according to Claim 42, wherein during the etching, one of a static [or] and time-variable[, in particular periodically varying or pulsed] magnetic field is generated, the direction of which is at least one of approximately [or] and predominantly parallel to a direction defined by the connecting line of the substrate [(10)] and the inductively coupled plasma [(14)].

50. (Amended) The method according to Claim 42, wherein one of a constant [or] and time-variable[, in particular pulsed,] radio-frequency power is applied to the substrate [(10)] via a substrate voltage generator [(12)].

51. (Amended) The method according to Claim 50, wherein the pulse duration of the radio-frequency power injected into the substrate is between one to one hundred times[, one to ten times in particular,] the period of oscillation of the high-frequency fundamental component of the radio-frequency power.

52. (Amended) The method according to Claim 50, wherein the radio-frequency power applies a time-average power of 5 watts to 100 watts to the substrate [(10)], [the] a maximum power of an individual radio-frequency power pulse being one to 20 times[, in particular twice to 10 times,] the time average power.

53. (Amended) The method according to Claim 51, wherein the frequency of the injected radio-frequency power is between 100 kHz to 100 MHz[, 13.56 MHz in particular,] and [that the] a pulse-to-pause ratio of the injected radio-frequency pulses is between 1:1 and 1:100[, 1:1 and 1:10 in particular].

54. (Amended) The method according to Claim 42, wherein the pulsing of the injected plasma power and one of the pulsing of the radio-frequency power injected into the substrate [(10)] via the substrate voltage generator [(12)] [or the] and a pulsing of the magnetic field, the pulsing of the injected plasma power and the pulsing of the radio-frequency power injected into the substrate [(10)] via the substrate voltage generator [(12)] are one of time-correlated [or] and synchronized with each other.